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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/801,285	03/07/2001	Jun Matsumoto	7217/64056	3773

7590

02/06/2004

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EXAMINER

LAO, TIM P

ART UNIT	PAPER NUMBER
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2655

DATE MAILED: 02/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/801,285

Applicant(s)

MATSUMOTO ET AL.

Examiner

Tim Lao

Art Unit

2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 07 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 5-7, 12-14, and 17 is/are rejected.
- 7) ☒ Claim(s) 2-4, 8-11, 15 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. Figure 7 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

The following changes are suggested to correct minor typographical errors.

- (a) p.16, equation 1: " $z(n+i)$ " should be changed to -- $x(n+i)$ --;
- (b) p.17, equation 2: " $e_{ref}(n9)$ " should be changed to -- $e_{ref}(n)$ --;
- (c) p.23, equation 4: " $0 < n < L/2$ " should be enclosed with a closing parenthesis as in -- $0 < n < L/2)$ --.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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4. Claims 1, 5-7, 12-14, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Kleijn (U.S. Patent 5,517,595).

<p>Claim(s) 1</p>	<p>Kleijn discloses:</p> <p>an audio signal processing apparatus (speech coding apparatus: col.2, L.36-37) for reproducing an audio signal by decoding encoded predictive (LP residual, Fig.10: 203; Fig.2; col.4, L.19-20) residual signals produced by forward prediction on a frame by frame basis, the apparatus comprising:</p> <p>excitation source modifying means (Fig.10: 231) for extending said predictive residual signals on a time axis; and (col.2, L.41-42; col.4, L.57-65)</p> <p><i>{1. Excitation source modifying means comprise performing pitch detection and extracting prototype waveform from the linear predictive (LP) residual signal. (col.2, L.41-42)</i></p> <p><i>2. In extracting prototype waveforms, the residual signal segment is extended for at least one-half pitch period. (col.4, L.57-65)</i></p> <p><i>3. Forward prediction is e.g., extending the residual signal (periodic for voiced signal) for prediction using past signal samples.}</i></p> <p>synthesizing means (Fig.11: 321, 322, 323, 303) for synthesizing (through the LP synthesis filter) an audio signal based on predictive residual signals (the reconstructed residual signal) converted by said excitation source modifying means. (col.2, L.42-L.48)</p>
<p>Claim(s) 5</p>	<p>Kleijn discloses:</p> <p>The audio signal processing apparatus as set forth in claim 1, wherein</p> <p>said excitation source modifying means extends said predictive residual signals by a predetermined extension rate by finding a signal having a predetermined length (e.g., one-pitch period) from the end of the predictive residual signals of a frame; and (col.4, L.61-65; col.8, L.1-24)</p> <p><i>{For successive prototype waveform extraction, the current residual signal segment is extended by one pitch period from the end (or center) of the previous residual signal segment to the end (or center) of the current residual signal segment respectively. (col.4, L.61-65; col.8, L.1-24; Fig.12a; col.9, L.37-62)}</i></p>

	<p>concatenating said signal after the end of the predictive residual signals to generate extended predictive residual signals (reconstructed residual). (col.2, L.45-47)</p> <p><i>{Each prototype waveform extracted from the residual signal is a representative of a residual signal segment. Concatenation of the successive prototype waveforms generates the reconstructed predictive residual signal. (col.2, L.45-47)}</i></p>
Claim(s) 6	<p>Kleijn discloses:</p> <p>The audio signal processing apparatus as set forth in claim 1, wherein said synthesizing means comprises a linear prediction (LP) code synthesis filter 303. (col.2, L.47-48)</p>
Claim(s) 7	<p>Kleijn discloses:</p> <p>An audio signal processing apparatus (speech coding apparatus: col.2, L.36-37) for reproducing an audio signal by decoding encoded predictive (LP residual, Fig.10: 203; Fig.2; col.4, L.19-20) residual signals produced by forward prediction on a frame by frame basis, the apparatus comprising:</p> <p>excitation source modifying means (Fig.10: 231) for extending the predictive residual signals by connecting data estimated by extrapolation to signals of a frame while maintaining the pitch, and (col.2, L.41-42; col.4, L.57-65)</p> <p><i>{1. Excitation source modifying means comprise performing pitch detection and extracting prototype waveform from the linear predictive (LP) residual signal. (col.2, L.41-42)</i></p> <p><i>2. In extracting prototype waveforms, the residual signal segment is extended for at least one-half pitch period. (col.4, L.57-65)</i></p> <p><i>3. Forward prediction is e.g., extending the residual signal (periodic for voiced signal) for prediction using past signal samples.}</i></p> <p>synthesizing means (Fig.11: 321, 322, 323, 303) for synthesizing an audio signal based on predictive residual signals converted by said excitation source modifying means. (col.2, L.42-L.48)</p>
Claim(s)	Kleijn discloses:

12	<p>The audio signal processing apparatus as set forth in claim 7, wherein</p> <p>said excitation source modifying means extends said predictive residual signals by a predetermined extension rate by finding a signal having a predetermined length (e.g., one-pitch period) from the end of the predictive residual signals of a frame; and (col.4, L.61-65; col.8, L.1-24)</p> <p><i>{For successive prototype waveform extraction, the current residual signal segment is extended by one pitch period from the end (or center) of the previous residual signal segment to the end (or center) of the current residual signal segment respectively. (col.4, L.61-65; col.8, L.1-24; Fig.12a; col.9, L.37-62)}</i></p> <p>concatenating said signal after the end of the prediction residual signals to generate extended predictive residual signals (reconstructed residual). (col.2, L.45-47)</p> <p><i>{Each prototype waveform extracted from the residual signal is a representative of a residual signal segment. Concatenation of the successive prototype waveforms generates the reconstructed predictive residual signal. (col.2, L.45-47)}</i></p>
Claim(s) 13	<p>Kleijn discloses:</p> <p>The audio signal processing apparatus as set forth in claim 7, wherein said synthesizing means comprises a linear prediction (LP) code synthesis filter 303. (col.2, L.47-48)</p>
Claim(s) 14	<p>Kleijn discloses:</p> <p>An audio signal processing method (speech coding method: col.2, L.36-37) for extending predictive (LP residual, Fig.10: 203; Fig.2; col.4, L.19-20) residual signals on a time axis in decoding a signal encoded by forward prediction on a frame by frame basis, comprising the steps of:</p> <p><i>{Speech coding method is for extending predictive residual signals on a time axis.}</i></p> <p>processing for extending (Fig.10: 231) the predictive residual signals by connecting data estimated by extrapolation to signals of a frame while maintaining the pitch so as to extend the signals of one frame, and (col.2, L.41-42; col.4, L.57-65)</p>

	<p><i>{1. Excitation source modifying means comprise performing pitch detection and extracting prototype waveform from the linear predictive (LP) residual signal. (col.2, L.41-42)</i></p> <p><i>2. In extracting prototype waveforms, the residual signal segment is extended for at least one-half pitch period. (col.4, L.57-65)</i></p> <p><i>3. Forward prediction is e.g., extending the residual signal (periodic for voiced signal) for prediction using past signal samples.}</i></p> <p>processing (Fig.11: 321, 322, 323, 303) for synthesizing (through the LP synthesis filter) an audio signal based on said extended predictive residual signals (the reconstructed residual signal). (col.2, L.42-L.48)</p>
Claim(s) 17	<p>Kleijn discloses:</p> <p>The audio signal processing method as set forth in claim 14, further comprising:</p> <p>extending said predictive residual signals by a predetermined extension rate by finding a signal having a predetermined length (e.g., one-pitch period) from the end of the predictive residual signals of a frame; and (col.4, L.61-65; col.8, L.1-24)</p> <p><i>{For successive prototype waveform extraction, the current residual signal segment is extended by one pitch period from the end (or center) of the previous residual signal segment to the end (or center) of the current residual signal segment respectively. (col.4, L.61-65; col.8, L.1-24; Fig.12a; col.9, L.37-62)}</i></p> <p>concatenating said signal at the end of the predictive residual signals to generate extended predictive residual signals (reconstructed residual). (col.2, L.45-47)</p> <p><i>{Each prototype waveform extracted from the residual signal is a representative of a residual signal segment. Concatenation of the successive prototype waveforms generates the reconstructed predictive residual signal. (col.2, L.45-47)}</i></p>

Allowable Subject Matter

5. Claims 2-4, 8-11, and 15-16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim(s) 2	<p>Prior arts fail to show:</p> <p>the audio signal processing apparatus as set forth in claim 1, wherein said excitation source modifying means comprises:</p> <p>first dividing means for dividing said predictive residual signals into a plurality of sub-frames based on a pitch;</p> <p>second dividing means for dividing a signal of sub-frames into a first signal having a length m, where m is an integer and $m < L$, where L is the length of said sub-frame, and a second signal having a length, $L - m$, as a reference signal;</p> <p>finding means for finding a signal closest to said reference signal from an other sub-frame,</p> <p>wherein said excitation source modifying means shortens said predictive residual signals by concatenating the first signal and the closest signal.</p>
Claim(s) 3	<p>Prior arts fail to show:</p> <p>the audio signal processing apparatus as set forth in claim 2, wherein said finding means calculates cross-correlation values with said reference signal for signals of said other sub-frame, takes out a signal as the closest signal from a position where the calculated cross-correlation value becomes the largest.</p>
Claim(s) 4	<p>Prior arts fail to show:</p> <p>the audio signal processing apparatus as set forth in claim 2, wherein said finding means calculates a square error with said reference signal for signals of said other sub-frame and takes out a signal as the closest signal from a position where the calculated square error becomes the smallest.</p>

Claim(s) 8	<p>Prior arts fail to show:</p> <p>the audio signal processing apparatus as set forth in claim 7, wherein said excitation source modifying means comprises:</p> <p>dividing means for dividing a signal of said sub-frame into a first signal having a length m, where m is an integer and $m < L$, where L is the length of said sub-frame, and a second signal having a length, $L - m$, as a reference signal;</p> <p>finding means for finding a signal closest to said reference signal from an other sub-frame,</p> <p>wherein said excitation source modifying means shortens said predictive residual signals by concatenating the first signal and the closest signal.</p>
Claim(s) 9	<p>Prior arts fail to show:</p> <p>the audio signal processing apparatus as set forth in claim 8, wherein said excitation source modifying means comprises:</p> <p>first multiplying means for multiplying said reference signal by a first window function;</p> <p>second multiplying means for multiplying signal taken out from said other sub-frame by a second window function; and</p> <p>adding means for adding results of said first and second multiplying means,</p> <p>wherein said excitation source modifying means concatenates results of said adding means after the first signal taken out from said sub-frame to generate one pitch worth of new predictive residual signals.</p>
Claim(s) 10	<p>Prior arts fail to show:</p> <p>the audio signal processing apparatus as set forth in claim 8, wherein said finding</p>

	means calculates cross-correlation values with said reference signal for a signal of said other sub-frame and takes out a signal as the closest signal from a position where the calculated cross-correlation value becomes the largest.
Claim(s) 11	<p>Prior arts fail to show:</p> <p>the audio signal processing apparatus as set forth in claim 8, wherein said finding means calculates a square error with said reference signal for a signal of said other sub-frame and takes out a signal as the closest signal from a position where the calculated square error becomes the smallest.</p>
Claim(s) 15	<p>Prior arts fail to show:</p> <p>the audio signal processing method as set forth in claim 14, wherein the step of shortening said predictive residual signals includes:</p> <p>dividing a signal of said sub-frame into a first signal having a length m, where m is an integer and $m < L$, where L is the length of said sub-frame, and a second signal having a length, $L - m$, as a reference signal;</p> <p>finding a signal closest to said reference signal from an other sub-frame; and</p> <p>concatenating the first signal and the closest signal.</p>
Claim(s) 16	<p>Prior arts fail to show:</p> <p>the audio signal processing method as set forth in claim 15, further comprising shortening said predictive residual signals by</p> <p>first multiplication processing for multiplying said reference signal by a first window function;</p> <p>second multiplication processing for multiplying a signal taken out from said other sub-frame by a second window function; and</p>

	adding processing for adding results of said first and second multiplying means and concatenating the results of said adding processing after the first signal taken out from said sub-frame to generate one pitch worth of new predictive residual signals.
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Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent Documents:

[A] 6,456,964 B2 09/2002 Manjunath et al.

[B] 6,311,154 B1 10/2001 Gersho et al.

Other Publications:

[C] W.B. Kleijn, "Encoding speech using prototype waveforms," IEEE Trans. on Speech and Audio Processing, vol.1, No.4, pp.386-399, Oct. 1993.

[D] W.B. Kleijn et al., "A speech coder based on decomposition of characteristic waveforms," ICASSP '95, vol.1, pp.508-511, May 1995.

[E] G. Yang et al., "Voiced speech coding at very low bit rates based on forward-backward waveform prediction," IEEE Trans. on Speech and Audio Processing, vol.3, No.1, pp.40-47, Jan. 1995.

[F] M. Nishiguchi et al., "Harmonic and noise coding of LPC residuals with classified vector quantization," ICASSP '95, vol.1, pp.484-487, May 1995.

Art Unit: 2655

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tim Lao whose telephone number is 703-305-8955.

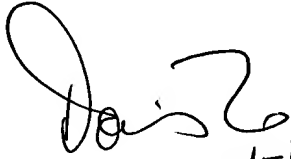
The examiner can normally be reached on M-F, 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached on 703-305-4827. The fax phone number for the organization where this application or proceeding is assigned is 703-305-9508.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-9000.

Tim Lao
Examiner
Art Unit 2655

TL
01/29/04


DORIS H. TO 2/5/04
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600